Chapter 12

12. INVENTORY AND MONITORING

12-1 Objectives

Military Readiness

- Provide an indicator of the land's capability to support military training
- Reveal areas that are best suited to objectives and types of military training
- Provide information that can be used in the training and scheduling process at the installation level
- Provide information that may affect force structuring and stationing decisions at MACOM and DA levels
- Provide information that helps determine those natural resources projects to improve and enhance the military training experience

Stewardship

- Provide an indicator of ecosystem integrity, status of sensitive species or communities, and other special interests
- Provide the means to implement an adaptive management strategy by providing current and predictive natural resources information that will affect decision-making, a critical component of ecosystem management
- Show areas where management could positively affect ecosystems
- Reveal areas where improvements or rehabilitation are needed to maintain ecosystem integrity
- Provide information to justify management actions to preserve or enhance certain resources before they become too degraded to restore

- Provide information upon which to base future management decisions

Quality of Life

- Indicate areas where wildlife viewing could be most advantageous
- Provide information to better manage game species and support hunting, fishing, and trapping programs
- Indicate needs for educating various user groups

Compliance

Provide inventory and monitoring data required to comply with the following laws, executive orders, instructions, regulations, and agreements:

- Sikes Act (PL 86-797;16 USC 670a *et seq*.)
- Clean Water Act (PL 95-217, as amended)
- Endangered Species Act (PL 93-205; 16 USC 1531 *et seq*.)
- National Environmental Policy Act (42 USC 4341)
- Federal Land Policy and Management Act (FLPMA)(PL 94-579; 14 USC 1701)
- Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (42 USC 9601 *et seq*.)
- Executive Order (EO) 11990 (*Wetlands Management*)
- Department of Defense Instruction 4715.3 (*Environmental Conservation Program*)
- Army Regulation (AR) 200-3 (*Natural Resources - Land, Forest, and Wildlife Management*)
- AR 200-1 (*Environmental Protection and Enhancement*)
- AR 200-2 (*Environmental Effects of Army Actions*)
- Numerous cooperative agreements with BLM, USFWS, and ADF&G

Integration

- Provide command elements with information needed to make decisions, which include natural resource related values
- Monitor the effects of various activities on natural resources
- Inventory and monitor Fort Greely's natural resources and regularly monitor resources that are important indicators of the following:
  - overall ecosystem integrity
  - capability of lands to support military missions
  - renewable product surpluses
  - status of sensitive species or communities
  - other special interests
- Provide the means to implement an adaptive management strategy by providing current and predictive natural resources information that will affect decision-making, a critical component of ecosystem management

12-2 Inventory (Planning–Level Surveys)

12-2a Soil Survey

Project Description. Identify and map soils, correlate soils to permafrost areas, and establish relationships among terrain components.

Project Justification. Fort Greely's soil survey is essential to establishing a database for planning effective management of withdrawn public lands. This survey is necessary for implementing this Integrated Natural Resource Management Plan, mandated by the Sikes Act, AR 200-3, and compliance with the Clean Water Act. Soils data are required for input into the military training and scheduling process.

Project Prescription. NRCS will be contracted to complete a soil survey in 1999. Black and white, infrared aerial photographs of Fort Greely will be converted to digital, ortho-corrected data. NRCS

will use this data to delineate soils. Following delineation, the soil survey will be assessed for accuracy through appropriate ground truthing methods. The final soil survey will be delivered to USARAK in February of 2000 in both digital and hardcopy format.

12-2b Wetland Survey

Project Description. Complete ongoing wetland surveys and develop a wetland management plan by 1999.

Project Justification. The National Wetlands Inventory failed to detect many of the smaller wetlands on Fort Greely, which rendered it inadequate for installation natural resources management programs. Wetland surveys on Fort Greely are required for management of withdrawn public lands. Planning-level wetland surveys are also required for implementation of the INRMP (Sikes Act) and compliance with Executive Order 11990 (*Wetlands Management*), AR 200-1, and AR 200-3. Surveys are required for inclusion in the next update of the INRMP and for input into the military training and scheduling process.

Project Prescription. USARAK has contracted with WES to expand the NWI survey to include small or obscured wetlands. Fieldwork began in 1997, with a completed project due in 1999. The final report will include digitized maps of all surveyed wetland boundaries.

USARAK will develop a wetlands classification system based on hydro-geomorphic characteristics of vegetative communities. The project will include a description of values and functions of wetlands on Fort Greely along with management recommendations. Both will be used to develop a wetland management plan, expected to be completed in 1999. Updated surveys will be required in FY 06.

12-2c Floristics Survey

During 1997-1998, CRREL conducted a limited floristic inventory for USARAK at Fort Greely. The inventory focused on vascular plants; cryptogams (*i.e.* mosses and lichens) were not identified.

Project Description. Conduct a floristic survey of Fort Greely.

Project Justification. This project is the 10-year update to determine trends in floristic biodiversity and improve the quality of the floristic database. An accurate floristic database is required to update and implement this INRMP, as required by the Sikes Act, and to comply with provisions of the Endangered Species Act, and AR 200-3.

Project Prescription. Updates to the baseline floristic inventory will be completed every 10 years. Thus, the floristic survey will be updated in FY 07. Details for the next floristic survey will not be available until the next INRMP is developed, but it is likely that the survey will include cryptogams. The Fort Greely floristic species list will be modified as other species are identified through the LCTA program. No other floristic surveys are planned for 1998-2002 unless special circumstances dictate otherwise.

12-2d Ecological Land Classification and Evaluation

Project Description. Complete ecological land classification and synthesize results from integrated resource studies to map ecologically sensitive portions of the landscape to facilitate land management and minimize impacts to ecosystems.

Project Justification. The identification of ecologically sensitive areas on Fort Greely and threats to these areas are critical to management of the entire installation. This project will directly support the military mission by identifying locations where special precautions should be taken during training, and thus, by default, also identifying areas where special precautions need not necessarily be taken.

Project Prescription. Computer modeling and simulation will be used to develop the ecological land classification and evaluation. The project is designed to emphasize three aspects of ecosystem management on Fort Greely: the sensitivity and recovery of ecosystems to disturbance, permafrost distribution and relative stability, and the value of wildlife habitats (ABR, Inc. and Northern Land Use Research, Inc., 1998).

12-2d(1) Ecological Land Classification

Description. Complete an ecological land classification for Fort Greely.

Justification. The ecological land classification will be used to develop the 2002 revision of the Integrated Natural Resource Management Plan as mandated by the Sikes Act, AR 200-3, the Clean Water Act, and the cooperative agreement for management of fish and wildlife resources on Army lands in Alaska. Land classification data are required for input into the training and scheduling process.

Methods. Field surveys for the ecological land classification were completed in FY 96. In 1997, ABR completed follow-up work on the expanded pilot study, which included verification of mapping accuracy and further field sampling in ecosystems not sampled adequately in 1995. See Section 8-1b for a description of the pilot study for this project.

All of Fort Greely was mapped into categories of ecosites, ecosubdistricts, and ecodistricts. Combining associations of vegetative types and geomorphological classes creates ecosites. Ecosites are subgroups representing vegetation types or successional stages within a uniform soil and geomorphic class. Ecosubdistricts are areas with relatively uniform geomorphic features that have recurring patterns of soils and vegetation. Several vegetation classes may be included in an ecosubdistrict, but they are usually related because they occur as different stages in a successional sequence. Ecodistricts are broader areas with similar geology, geomorphology, and hydrology and are similar to physiographic units.

A preliminary map and report will be produced for USARAK in 1998, with a final map and report to be completed in 1999. Survey data will be stored in a digital format in the USARAK GIS. The ecological land survey will need to be updated in FY 05.

12-2d(2) Permafrost Distribution and Stability

Description. Characterize physical and thermal properties of permafrost, analyze relationships of permafrost with other terrain components, model permafrost distribution, and assess the response of permafrost to disturbance.

Justification. Permafrost affects military use of Fort Greely in many ways, including facilities development and training operations. Understanding its locations and response to disturbance is essential to long-term use of Fort Greely.

Methods. Physical and thermal properties of permafrost will be described at three sites within three geomorphic units (Abandoned Flood plain, Lowland Retransported Deposits, and Residual soils on north-facing slopes) for a total of nine locations. At each sample site, soil stratigraphy will be described from a pit (1-1.5 meters deep) or from cores (2-3 meters deep) obtained by a SEPRE corer. Stratigraphic descriptions will include soil texture (Soil Survey Staff, 1993) and ice structures (Shur and Jorgenson, in press). Samples will be taken every 20-30 centimeters for determination of moisture and bulk density. Air and soil temperatures (5 centimeters depth) will be collected at 30 locations (15 ecosystems x 2 replications) using small dataloggers (HoboTempsTm) equipped with thermistors. Temperature measurements will be collected every 2 hours from 15 April 1998 to 1 October 1999. Snow surveys will be conducted three times during winter (1998-1999) to measure snow depths at the soil temperature locations. At each monitoring site, soil samples will be taken from the various horizons (3-5) with the active layer (or top one meter) for analysis of moisture and bulk density. Soil characteristics will be compared among ecosystems and geomorphic units (ABR, Inc. and Northern Land Use Research, Inc., 1998).

Results from analyses will be used to develop parameters for a model of permafrost distribution using a model developed by Jorgenson and Kreig (1988) and modified by Wright et al. (1994) and applying spatial databases created by the Fort Greely Ecological Land Survey. Measuring presence or absence of permafrost at 50 locations accessible will assess validity of the model by the road system. The model will be used to assess the response of permafrost to disturbance. A final report is due 1 November 1999 (ABR, Inc. and Northern Land Use Research, Inc., 1998).

12-2d(3) Habitat Use

Description. Analyze Fort Greely for habitat use by passerines and small mammals, and rank them to diversity of wildlife species by relative value.

Justification. An important aspect of ecological sensitivity is the value of areas to wildlife. Decisions for the management of natural resources and the

minimization of damage to components of ecosystems require knowledge of relative values, and habitat values are critical to this process. USARAK will share data on passerine habitat use with the Fairbanks Ecological Services office.

Methods. The use of habitats or ecosystems will be analyzed in a two-tiered approach using data collected by the faunal surveys and from literature reviews. First, associations between habitats and passerines and small mammals will be analyzed using field data obtained by faunal surveys. Specific analytical methods to be used will depend on the amount of data collected for various species and habitat. Second, an overall index of habitat value will be developed using habitat use information obtained from empirical analyses and from literature for a broader range of species. The synthesis and qualitative ranking of habitat values will depend on sample sizes acquired for various species during faunal surveys and the completeness of habitat use information available from literature for each species. A final report is due 1 November 1999 (ABR, Inc. and Northern Land Use Research, Inc., 1998).

12-2e Forest Ecosystem Inventory

Project Description. Conduct an inventory of the forest resources on Fort Greely within ecological management units as part of the process of preparing a forest management plan (Section 14-2a).

Project Justification. Recent requests from the public indicate the need to conduct forest inventories to determine if Fort Greely can support a commercial forest program. Under Public Law 99-606 and other land withdrawal legislation, the Bureau of Land Management controls the vegetative resources on Fort Greely, but BLM does not have the resources to conduct a complete inventory. A broad-based forest resources study (Tanana Chiefs Conference, 1993) included Fort Greely, but most calculations were based on extrapolation from relatively few on-post sites and many off-post sites. This data is inadequate for management of the forest ecosystem on the installation. The Sikes Act requires those withdrawn lands, such as at Fort Greely, be included in INRMP planning and program implementation, including forest management. Forest inventories are required by AR 200-3 to conduct forestry and implement the INRMP.

Project Prescription. Total land area available for forest management is 391,851 acres (Tanana Chiefs Conference, 1993). Beginning in 1999, USARAK will annually inventory 10% or about 39,000 acres of lands that may have viable commercial forest value. This inventory will use ecological land classification units (see Section 12-2d(1)) to delineate and sample stands to determine merchantable volumes by species.

USARAK began this process by purchasing forest inventory equipment in 1998. This equipment includes diameter tapes, prisms, logging tapes, increment borers, clinometers, handheld field computers, and other equipment necessary to delineate stands and conduct measurements within these stands. Other support costs will include transportation and computer data storage/analysis (including a personal computer for the forest technician).

12-2f Threatened and Endangered Species Surveys

Project Description. Conduct threatened and endangered species surveys as needed.

Project Justification. There are no threatened or endangered species known to inhabit Fort Greely. The American peregrine falcon is known to use the area; it is not known if falcons nest on post. The Endangered Species Act, Sikes Act, and AR 200-3 require surveys for threatened or endangered species. Surveys are required for the 2002 revision of this INRMP and as input into the training and scheduling process.

Project Prescription. The 1997-initiated survey for threatened or endangered species will be completed in 1998. Survey data will be input digitally into the USARAK GIS. Updated surveys will be required in 2006. The project described in Section 12-2i includes a survey for possible nesting sites of the American peregrine falcon on Fort Greely. There are no plans for additional surveys for threatened or endangered species during 1998-2002. If new species are listed, or there is reason to believe that listed species might be present on Fort Greely, USARAK will take appropriate steps to survey for them.

12-2g Fauna Planning-Level Surveys

Project Description. Conduct fauna planning-level surveys of birds, fish and small mammals on Fort Greely. Conduct surveys for neotropical, waterfowl, and raptor avian species; salmon, trout, grayling, and other fish species; and small mammal species.

Project Justification. This project is a 10-year update to determine trends in faunal biodiversity and improve the quality of the faunal database. An accurate faunal database is necessary to update and implement this INRMP, as required by the Sikes Act, and to comply with provisions of the Endangered Species Act and AR 200-3.

Project Prescription. Conduct surveys of neotropical, waterfowl and raptor avian species; salmon, trout, grayling, and other fish species; and small mammal species.

12-2g(1) Nesting Raptor Survey

Description. Locate nesting sites of three sensitive raptor species: peregrine falcon, golden eagle, and bald eagle; and collect incidental information on other cliff nesting (*e.g.* gyrfalcon) and tree-nesting (*e.g.* northern goshawk and great grey owl) species. Raptors are important components of the ecosystem and many, particularly the three targeted species of this inventory, are vulnerable to human impacts as evidenced by their listing either in Alaska or in other areas of the United States.

Methods. This CRREL project (ABR, Inc. and Northern Land Use Research, Inc., 1998) will locate and map active and inactive nest structures for the target species and will identify and qualitatively assess cliffs and riparian areas for nesting habitat for these species. This survey will evaluate areas on Fort Greely and will be completed in conjunction with a similar inventory on the Yukon Training Area.

A pre-leaf-out (mid-May) aerial survey will be used to identify and map large stick nests (bald eagles) as well as incidental nest sites for other tree-nesting species. Survey crews (pilot and two observers) will use a Cessna 185.

An early to mid-incubation period survey (late May-early June) will be used to identify large stick nest platforms (golden eagles and peregrines) and/or occupancy of cliff sites by raptors. In addition, cliffs will be evaluated for their potential use by nesting raptors. Survey crews (pilot and at least one observer) will use a helicopter. If necessary the crew will land near cliff areas to provide more detailed scrutiny of nests.

Raptor nest sites and habitat data will be digitized as ArcInfo GIS databases. Maps will be produced as a layer for inclusion with DMA Military Specials 1:50,000 scale digital map files. Significant sites (nest locations, cliff areas) will be classified to habitat types based on ecological land survey maps. Fieldwork began in May 1998, and additional fieldwork will be scheduled in 1999 if needed. A final report is due 1 November 1999.

12-2g(2) Neotropical Migratory Bird Surveys

Description. Conduct neotropical migratory bird surveys during FY 98 to develop GIS databases, bird-habitat models, and status reports. There is considerable concern in North America over declining numbers of many neotropical migratory birds. The Department of Defense is a major participant in the nationwide Partners in Flight program. Data on the status of neotropical migratory birds are required to manage and protect these declining species, as mandated by the Sikes Act and AR 200-3.

Methods. Breeding bird checklists, point counts, and constant effort mist-netting stations will be utilized. End products will be the development of a GIS database, bird-habitat models, and reports to be included in the INRMP. Data collected from a neotropical bird monitoring project on Fort Greely (Section 12-3a(4)) will be used to augment this baseline data project.

12-2g(3) Small Mammals

Description. Develop a list of mammals that occur on Fort Greely, assess small mammal and furbearers habitat associations for use in ecological land evaluation; and document the occurrence and relative abundance of species of concern (lynx, river otter, Alaska tiny shrew) or relatively unique small mammals (hoary marmot and woodchuck).

Small mammals play important ecological roles as secondary consumers and as prey for a variety of predators. The lynx is a former Category 2 species and is a CITES Appendix II species; the river otter

is listed on CITES Appendix II; and the Alaska tiny shrew is newly described and apparently rare, found in small numbers in widely separated parts of Alaska. Other small mammals that are potentially rare inhabitants of Fort Greely include the long-tailed vole, northern bog lemming, brown lemming, and water shrew. Fort Greely may have populations of hoary marmots and woodchucks, which are unique to interior Alaska.

Relatively little information on mammals of interior Alaska is available in literature (ABR, Inc. And Northern Land Use Research, Inc., 1998). There has been no systematic survey for small mammals on Fort Greely. Surveys are required to protect and manage these species in accordance with provisions of the Sikes Act and AR 200-3.

Methods. The survey will include small mammal trapping in mid- to late summer 1998 with additional trapping targeted at rare species in 1999, if needed. Traps will be set in pairs at intervals of 10-20 meters along toposequence transects. An additional truck and snowmachine survey will be conducted during February or March 1999 to search transects for tracks (ABR, Inc. and Northern Land Use Research, Inc., 1998).

A list of mammal species will be compiled from field sampling. When sample sizes are large enough, analyses will be done to assess habitat associations by species. Specific analysis methods will be sample size-dependent. A final report will be completed by 1 November 1999 (ABR, Inc. and Northern Land Use Research, Inc., 1998).

USARAK will use incidental and planned observations to better define the distribution and relative abundance of hoary marmot and woodchucks on Fort Greely over the next five years. Marmot surveys will involve the use of binoculars and spotting scopes to view talus and rocky slopes during summer months. USARAK personnel will survey for woodchucks largely using incidental observations on road cuts. Observations of both species will be incorporated into GIS databases.

12-2h Archaeological Planning-Level Survey

The archeological planning-level survey is not directly a part of the natural resources program at Fort Greely. It is included here due to its impacts on implementation of this INRMP.

Project Description. Conduct a cultural resources planning-level survey on Fort Greely.

Project Justification. Cultural resources planning-level surveys on Fort Greely are required by the National Historic Preservation Act, EO 11593, *Protection and Enhancement of the Cultural Environment*, EO 13007, *Indian Sacred Sites,* and the National Environmental Policy Act.

Project Prescription. Model and survey probable archaeological sites to determine training land availability and uses. Additional details on this survey will be included in the Cultural Resources Management Plan, being prepared by the State Historic Preservation Office.

12-2i Recreational Surveys

12-2i(1) Survey Trails on East Side of The Delta River

Description. Inventory and map trails used on the east side of the Delta River. Emphasis will be placed on recording hunting stands, bear baiting stands, and military use. The survey is to be used by natural resources and recreational managers. The information obtained will help plan for recreational improvements, and determine how to sustain the natural resources.

Methods. This area is mainly used during winter when it is accessed by snowmobile. The survey requires a person be present in the area for one to two weeks during the winter to determine trail location and usage. A report with photos and identified uses would be available at the Natural Resources office.

12-2i(2) Fishing and Fishing Access Survey at Fort Greely

Description. Survey all stocked lakes on Fort Greely for available access, and recreational and fishing use. Determine requirements for maintaining the areas. This survey will be used by natural resources managers, recreational managers, and ADF&G. The information collected will include available facilities and access, stocking rates of fish, and use of each lake. The information obtained will help plan

for recreational improvements, and determine how to sustain the natural resources.

Methods. It will require one person to visit all stocked lakes during the summer (approximately 1-week). The survey will focus on available access to determine if it needs to be improved. Also, photos and Global Positioning Systems (GPS) coordinates will be taken. The fish stocking report from the state will help prioritize lakes to be surveyed.

12-2i(3) Trespass Structures

Description. Find, document, and map all unauthorized structures on Fort Greely. There are nine known unauthorized structures on Fort Greely ranging from tent platforms to cabins. All of the structures were constructed without approval from the Secretaries of Defense and Interior, and thus are considered trespass structures. These structures can create safety hazards during military exercises. USARAK is working with BLM to identify the owners of the trespass structures to have them removed.

Methods. Surveys will be conducted by helicopter and all-terrain vehicle (ATV). Photos and GPS locations will be taken for each trespass structure located. A trespass structure book, similar to the one created for Fort Wainwright will be created to document their location. Other information such as the owner, history, etc., will be included if known. It will take one natural resources personnel two weeks to locate and document structures. Another week in the office will be required to create the trespass structure book. The survey will be conducted in the winter of 1998-1999 and the summer of 1999. The trespass structure book will be completed by September 1999.

12-3 Monitoring

During 1998-2002, monitoring on Fort Greely will include fish and wildlife, forest inventory, trespass structure surveys, recreational use, vegetation and soil condition, and water quality.

12-3a Fish and Wildlife

Project Description. Monitor the population status of faunal species.

Project Justification. Monitoring is required to maintain programs and plans mandated by the Sikes Act, AR 200-3, and the cooperative agreement for management of fish and wildlife resources on Army lands in Alaska. Monitoring data are required for input into the training and scheduling process.

Project Prescription. Key species include trout, salmon, moose, buffalo, bears, great grey owls, northern goshawks, wolves, small mammals, and neotropical migratory birds. Game and furbearer monitoring will emphasize moose, buffalo, ruffed grouse, black bears, and wolves. Moose and bears are monitored to ensure harvest levels are optimal for both utilization and protection of the species. Ruffed grouse are monitored to determine habitat improvement needs and to monitor success of habitat improvement practices. Wolves are monitored to determine their relationships to other animals, especially moose, on Fort Greely and elsewhere in the region. Monitoring data will be digitally stored in the USARAK GIS.

12-3a(1) Moose

Description. Monitor moose populations and harvest data. Submit moose harvest and monitoring data to ADF&G to determine population levels and set harvest levels for the following year. Moose are the most important game species on Fort Greely in terms of hunter demand. Considerable hunting pressure on this species requires that moose populations and harvest be monitored to ensure sustainability of the population. Surveys are critical to good wildlife management, because moose migrate considerable distances and the timing and location of their migrations are not predictable. It is difficult to compare annual data for only a portion of the moose range. To determine population status of moose, ADF&G relies on density data within game management units, rather than Fort Greely alone. Data collected include number of bulls, cows, and calves.

Methods. Fort Greely and ADF&G initiated a monitoring project to radio-collar and track moose to better understand their seasonal movements (U.S. Army, 1986; BLM and U.S. Army, 1994). Fifteen to twenty moose were radio-collared as part of this joint project. Data collection was limited due to elimination of a wildlife biologist position on Fort

Greely in 1991, other ADF&G priorities, and lack of funds. This project is no longer a priority and therefore, there are no plans to collar additional moose.

Moose have been surveyed by ADF&G on Fort Greely since the 1960s. Surveys are conducted during late fall, usually from mid-October through early December. Timing is difficult since only a few days of good flying conditions occur after snowfall, and there are many competing uses for available aircraft.

The former Fort Greely wildlife biologist assisted with moose surveys. ADF&G have not surveyed the West Training Area for many years because that portion of Game Management Unit 20A is their lowest priority.

Most of the moose hunting on Fort Greely occurs in 20D; thus it is a high priority area. Unit 20D will be surveyed every three years between mid-October through early December. The first survey occurred in 1998, with a follow-up survey scheduled for 2001.

ADF&G biologists are considering changes in moose census techniques. One strategy is to survey 20D and 20A (including the West Training Area) on a regular basis. Another strategy would be to fly all of Fort Greely every three years, effectively making Fort Greely a separate management unit. There are advantages to both strategies. A decision will be made during the next five years.

ADF&G uses stratified sampling units (high and low-density areas) for its moose surveys with a goal of 80% sightability. If new areas are added to the survey, ADF&G will conduct intensive surveys to determine a sightability correction factor for new routes. If additional moose surveys are conducted on Fort Greely, the Army will reimburse ADF&G about $10,000 every three years for each survey.

Check stations are established each September to monitor the moose harvest on Fort Greely. Check stations are established on 33-Mile Loop and at GRTS by Military Police game wardens. Check station operation will continue during 1998-2002 or until jurisdiction for the game warden function moves to Fort Wainwright. At that time, check stations will be operated as available manpower allows.

12-3a(2) Bison

Description. Monitor bison on Fort Greely to avoid conducting military activities or operations, in or near bison habitats on the West Training Area, during mid February through early September. The Army changes range firing during bison calving season if needed (Section 13-4b(3)). If necessary, the Army may drive bison from areas where military operations are planned. So far, this has not significantly affected military operations on Fort Greely.

Methods. Fort Greely will monitor bison via helicopter when possible, to determine population levels and herd movements (U.S. Army, 1986; BLM and U.S. Army, 1994). Fort Greely will adhere to the minimum disturbance period (mid February through early September) established by ADF&G on the West Training Area. During this time, the military will not conduct activities or operations in or near bison habitats when bison are present to minimize adverse effects on bison.

12-3a(3) Small Game

Description. Monitor small game emphasizing sharp-tailed grouse. Sharp-tailed grouse are the most harvested small game species on Fort Greely. Fort Greely has prime sharp-tailed grouse habitat with no significant controls on hunting. Population information is especially important. Little is documented regarding the distribution and relative population size of sharp-tailed grouse, ruffed grouse, and ptarmigan on the post.

Methods. ADF&G has established a ruffed grouse drumming survey at Fort Greely on the Main Supply Route (MSR) between the Alabama Range to Lampkin Range, paralleling the highway. The route has twelve 4-minute stops. Monitoring began in 1994 and will continue at least through 2001.

ADF&G plans to monitor sharp-tailed grouse on Fort Greely. The project has gone as far as identifying leks. Army personnel will conduct sharp-tailed grouse flush counts on these leks in late April-early May of each year during 1998-2002. This is not a standard technique, but it will provide trend information and help identify quality sharp-tailed grouse habitat and management options. USARAK has an unfunded project to evaluate sharp-tailed grouse habitat.

12-3a(4) Neotropical Migratory Birds

Description. Determine the status of neotropical migratory birds on Fort Greely. There is considerable concern in North America over declining numbers of many neotropical migratory birds. The Department of Defense is a major participant in the nationwide Partners in Flight program.

Methods. During 1998-2002, Fort Greely personnel will investigate the costs and benefits of establishing Breeding Bird Surveys (BBS), MAPS (Measuring Avian Productivity and Survival) stations (DeSante and Burton, 1994), and/or other types of bird surveys. A partnership with ADF&G is possible for accomplishing these surveys. USARAK will work with USFWS to determine if BBS routes should be monitored on Fort Greely.

12-3a(5) Wolf

Description. Collect and analyze wolf harvest data. Submit wolf harvest and monitoring data to ADF&G to determine population levels and set harvest levels for the following year. Provide access to ADF&G to conduct wolf monitoring on Game Management Unit 20A. The wolf is a very high profile species in Alaska, with an ongoing public and agency debate over management of wolves.

Methods. The objective of monitoring is to determine the number of wolf packs in the area and their relationships with moose. USARAK monitoring will be accomplished through trapping reports. ADF&G will use radio collars to monitor individual wolves and pack movements. During 1998-2002, Fort Greely will provide access to ADF&G to facilitate this study, although most of this survey involves Fort Wainwright (Tanana Flats Training Area).

12-3a(6) Delta Caribou Herd

Description. Assist ADF&G when possible with monitoring the Delta caribou herd. Caribou calving areas are located on Fort Greely. ADF&G notifies Range Control when caribou are calving on Fort Greely, and military activities may be altered to prevent disturbance (see Section 13-4b(3)).

Methods. ADF&G monitor caribou on Fort Greely. USARAK will assist ADF&G with helicopter and personnel when available.

12-3a(7) Waterfowl and Waterbirds

Description. Monitor waterfowl and waterbirds, particularly trumpeter swans and sandhill cranes. During migration periods, more than 300,000 cranes and 20,000 geese, ducks, and swans pass through the Greely/Delta area. Fort Greely may provide important staging sites for some migrating waterbirds, but relatively little is known about the occurrence or use of such sites.

Methods. USARAK will annually conduct waterfowl surveys of the wetlands in the West Training Area and Main Post. Surveys will normally be conducted in May from the ground.

During the fall migration period (September-October), three 4-hour aerial surveys (one pilot and one observer in a Super Cub) were flown to locate staging areas for migrating waterfowl on Fort Wainwright. These surveys included Fort Greely. Follow-up data collection may be required during summer-fall 1999. Data will be digitized into the GIS database, and significant sites (nest locations, roost sites, staging areas) will be classified to habitat based on ecological land survey maps. The final report is due 1 November 1999.

12-3b Land Condition-Trend Analysis

Project Description. Land Condition-Trend Analysis (LCTA) is the monitoring and data storage portion of ITAM. It is the basis for much of the decision making for ITAM and other programs. LCTA will be used to annually monitor the condition of training lands and provide the ecological information to predict range carrying capacity.

Project Justification. LCTA is an essential part of Integrated Training Area Management (ITAM), which directly supports military training. Benefits of LCTA to training include (1) collecting land condition data to develop GIS overlays, providing training area-specific carrying capacity estimates for range planning, and for calculating the Army Training and Testing Area Carrying Capacity (ATTACC) model and (2) providing Site Rehabilitation Prioritization (SRP) data to prioritize LRAM projects.

Project Prescription. Use LCTA to annually monitor the status of the condition of training lands and

provide the ecological information to predict range carrying capacity. USARAK purchased four Trimble ProXL GPS units in 1998 to use for LCTA. GPS units are required to conduct land use mapping and plot location, to identify LRAM projects, and to site new temporary ranges for Range Control. Benefits to training include accurate land-use mapping, man-made feature mapping, and cost savings in locating LCTA plots.

USARAK will purchase LCTA field equipment during 1998-2002. Equipment is necessary to operate the LCTA program at USARAK. Equipment will be obtained through local purchase.

12-3b(1) Conduct LCTA Plot Monitoring and Data Analysis

Project description. Monitor LCTA plots throughout the training areas.

Methods. LCTA monitoring is conducted using Alaska Region LCTA methods. The maintenance of range planning, natural resources, and cultural resources data is accomplished with the Geographical Information System (GIS) computer system. Alaska Region LCTA methods, developed specifically for the three Alaska installations, determine the condition of training lands and provide the ecological information necessary to predict carrying capacity. Alaska Region LCTA provides a collection of data used as the basis for land condition overlays, training area-specific carrying capacity estimates, and for calculating the ATTACC model and Site Rehabilitation Prioritization (SRP) data to be used to prioritize LRAM projects.

USARAK will conduct LCTA monitoring annually using Alaska Region 2.0 Methods. Fieldwork will be conducted June-August. Primary military land uses (bivouac areas, maneuver areas, foot training, road rights-of-way, firing points, impact area, etc.) are delineated into polygons in every training area. More LCTA plots are established in polygons that receive vehicular traffic (bivouac areas, maneuver areas, firing points, and road rights-of-way). Plot inventories include ground cover, species composition, site rehabilitation prioritization, tree condition, and land use. The number and location of plots to be read each year will be determined specifically to meet the needs of Fort Greely.

12-3b(2) Military Exercise Impacts

Project Description. Monitor military exercises, such as Arctic Strike and Northern Edge, in the field. USARAK, as with the Army as a whole, is committed to environmental compliance and stewardship, and has invested considerably in providing soldiers with the methods to both train effectively and protect the environment. Recent revisions (November 1997) to the Sikes Act require "no net loss" in the capability of military installation lands to support its military mission. Other environmental laws require specific actions or precautions while training on Fort Greely. Both compliance and stewardship commitments require monitoring of military exercises.

Methods. Natural Resources and Environmental personnel will cooperate with field monitoring. Emphasis will be to assist soldiers who are either bivouacking or conducting maneuver exercises with such matters as hazardous materials management, maneuver damage minimization, and wetlands protection.

Monitoring teams will coordinate with Range Control to determine field exercise scheduling and planned activities to coordinate site inspections. Generally, inspection teams will consist of two personnel. Bivouac areas will be inspected for sanitation, hazardous waste, and natural resources compliance. Hazardous wastes Non Commissioned Officers will be consulted to determine their needs and to provide assistance, if needed. Firing points and maneuver areas will be inspected for clean-up and maneuver damage. Teams will use photographs, videos, GPS locations, and notes to present findings to Range Control. The use of three-year interval aerial photographs of remote areas on Fort Greely to monitor recreational impacts (Section 12-3f) will be cost-shared with this project since the photographs can be used for both projects.

Transportation is a key requirement for this project. Vehicular support may include all-terrain vehicles, snowmachines, 4-wheel drive vehicles, and/or SUSVs. Fuel needs can be substantial for SUSVs. Required equipment includes photography equipment, GPS, spill kits, radios, and in some cases, camping supplies.

12-3c Soil and Water Quality

Project Description. Monitor surface water quality, groundwater quality, and soil contaminants. Groundwater, surface water, and soil monitoring will be conducted to evaluate the presence of contaminants from the impact area.

Project Justification. Monitoring water quality is important for measuring ecosystem health on Fort Greely. Land-based environmental degradation eventually affects water quality and aquatic ecosystems. Water quality monitoring is required to comply with the Clean Water Act and other environmental laws and regulations. It will help formulate options for managing those species particularly dependent upon high water quality, as required by the Sikes Act and AR 200-3. Soil and water quality is an important issue for the surrounding population. Monitoring will be required as mitigation for the PL 99-606 lands withdrawal renewal starting November 6, 2001.

Project Prescription. There is no evidence surface waters on Fort Greely are significantly polluted, either from activities on the installation or in upstream areas off the installation. Therefore, there has been no regular monitoring of surface waters. In 1991-1992, the Army Environmental Health Agency (now the Center for Health and Preventative Medicine) sampled Bolio Lake and streams that flow through Fort Greely for munitions residues. The results were negative. CRTC has conducted further testing on Bolio Lake waters with similar results. Therefore, this project will focus on rivers and streams on Fort Greely. Water quality protocols will be developed by 2001. This project will begin in 2002 and probably continue for five years. Parameters to be measured will include sediment loading and pH values for all water bodies; and nitrites, nitrates, and heavy metals for impact areas and their downstream drainages.

Groundwater monitoring is not within the definition of a natural resources program within the DOD system of environmental management. However, a brief summary of groundwater monitoring is provided to indicate that the activity is important and does occur as an environmental compliance activity on Fort Greely.

12-3c(1) Surface Water Monitoring

Description. Monitor surface water on Fort Greely. Monitoring water quality is important for measuring ecosystem health on Fort Greely. Land-based environmental degradation eventually affects water quality and aquatic ecosystems. Water quality monitoring is required to comply with the Clean Water Act and other environmental laws and regulations, as well as to formulate options for managing those species particularly dependent upon high water quality, as required by the Sikes Act and AR 200-3.

Methods. There is no evidence that surface waters on Fort Greely are polluted significantly, either from activities on the installation or from upstream areas off the installation. As a result, there has been no regular monitoring of surface waters. Since some sampling of lakes has been completed, this project will focus on rivers and streams on Fort Greely. Water quality protocols will be developed by 2001.This project will begin in 2002 and will continue for five years. Parameters to be measured will include sediment loading and pH values for all water bodies; and nitrites, nitrates, and heavy metals for impact areas and their downstream drainages.

12-3c(2) Groundwater Monitoring

Description. Monitor groundwater to comply with laws and regulations and protect groundwater resources. Groundwater monitoring is required to comply with a number of environmental laws and regulations, especially when there is evidence of contamination. Groundwater monitoring is not a natural resources program within Army environmental management, but is included in this INRMP to show the program is conducted on Fort Greely.

Methods. Over the years, several monitoring wells have been installed on Fort Greely in the cantonment area. The Corps of Engineers (COE) sampled at least 15 monitoring and drinking wells semiannually through 1995. There are ongoing routine checks on drinking well water quality. Monitoring efforts indicate Fort Greely has had no significant contamination of groundwater. Monitoring will continue during 1998-2002.

12-3d Trespass Structures

Project Description. Conduct trespass structure monitoring.

Project Justification. Trespass structures are an illegal intrusion on public lands, create liabilities for the Army and BLM, and may significantly impact the environment. A trespass structure assessment is required by Federal Land Policy and Management Act (FLPMA), the Sikes Act, the Clean Water Act, and Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

Project Prescription. This project in ongoing. A full inventory of suspected encroachment structure sites should be completed by March 1999. Monitoring of sites will be conducted as needed until the issue is resolved. Some monitoring will likely occur indefinitely.

Surveys for trespass structures will use helicopters, all-terrain vehicles, and snowmachines. For efficiency, surveys on Fort Greely's western portion may be combined with surveys for trespass structures on Fort Wainwright. Data collected from each trespass structure will include GPS location, structure status, potential or actual contamination, solid waste and outbuildings, information on owners, photographs, and likely access route information. Site information will also include an assessment of safety hazards and impacts to wildlife, wetlands, and training. The initial inventory will prioritize removal and clean-up operations.

12-3e Recreational Impacts

Project Description. Monitor impacts of recreational use on the Fort Greely ecosystem.

Project Justification. Recreational use of military land in Alaska creates impacts on military training lands, primarily a result of legal recreational use and illegal trespass of recreational vehicles. A basic tenet of ecosystem management is the importance of human values and use. Fort Greely's outdoor recreation program affects ecosystems in terms of both products (fish and game species, firewood, etc.) and disturbance associated with recreationists. USARAK is well aware of the over-riding need to ensure these activities do not significantly impact ecosystem integrity.

12-3e(1) Impact Area Monitoring.

Description. Conduct impact area monitoring.

Methods. Fort Greely will monitor remote training areas and impact areas during 1998-2002. Remote areas are very costly to access on foot during most of the year. Videography would allow monitoring of remote areas more cost effectively. Monitoring will be conducted by videography of impact areas and remote training areas using helicopters and GPS units. The project will be cost-shared between DPTSM range and DPW. In addition, USARAK will take (or purchase) aerial photographs of these areas every three years to monitor long-term effects of recreational use of remote area. This portion of the project will be cost-shared with the project in Section 12-3d to monitor effects of military impacts.

12-3e(2) Conduct Monthly Flights.

Description. Conduct monthly flights to observe hunting and fishing on remote areas of Fort Greely.

Methods. Flights will monitor trespass structures and all forms of trespass. Flights also will support ITAM field operations, wildlife surveys, and enforcement activities. During the fall hunting season, USARAK personnel will make three helicopter flights to monitor hunting and other activities.

12-3e(3) Fishing Use.

Description. Determine the cost and benefit of stocking fish on Fort Greely.

Methods. ADF&G is interested in determining the cost and benefits of stocking fish on Fort Greely. Little data exists on fishing pressure and success. USARAK will monitor fishing on Fort Greely during stocking periods and the annual salmon run. Monitoring will be opportunistic, but a data collection and analysis system will be developed to acquire information to make future management decisions.

12-3e(4) Critical Areas.

Description. Protect critical areas from impacts of recreation.

Methods. Special consideration will be given to protect critical areas (nesting sites, highly erodable areas, etc.) from negative impacts due to outdoor recreation.